

Bioculture System Payload: From Experiment Definition to Flight

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Authors: Kevin Sato¹, Eduardo Almeida², and Edward Austin²

Address: NASA Ames Research Center, Moffett Field, CA 94035

e-mail: kevin.y.sato@nasa.gov, e.almeida@nasa.gov, edward.m.austin@nasa.gov

Affiliations: ¹Lockheed Martin, ²NASA

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Starting in 2015, the NASA Bioculture System will be available to the science community to conduct cell biology and microbiology experiments on ISS. The Bioculture System carries ten environmentally independent Cassettes, which house the experiments. The closed loop fluids flow path subsystem in each Cassette provides a perfusion-based method for maintain specimen cultures in a shear-free environment by using a biochamber based on porous hollow fiber bioreactor technology. Each Cassette contains an incubator and separate insulated refrigerator compartment for storage of media, samples, nutrients and additives. The hardware is capable of fully automated or manual specimen culturing and processing, including in-flight experiment initiation, sampling and fixation, up to BSL-2 specimen culturing, and the ability to up to 10 independent cultures in parallel for statistical analysis. The incubation and culturing of specimens in the Bioculture System is a departure from standard laboratory culturing methods. Therefore, it is critical that the PI has an understanding the pre-flight test required for successfully using the Bioculture System to conduct an on-orbit experiment. Overall, the PI will conduct a series of ground tests to define flight experiment and on-orbit implementation requirements, verify biocompatibility, and determine base bioreactor conditions. The ground test processes for the utilization of the Bioculture System, from experiment selection to flight, will be reviewed. Also, pre-flight test schedules and use of COTS ground test equipment (CellMax and FiberCell systems) and the Bioculture System will be discussed.

Support for the Bioculture System and Cell Science flight experiments is through the ISS National Lab at NASA Johnson Space Center and the ISS Utilization Office at NASA Ames Research Center